



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER OF PATENTS AND TRADEMARKS
Washington, D.C. 20231
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/845,654	04/30/2001	Todd P. Lukanc	39153/371 (F0812)	2723

7590 04/10/2002

Paul S. Hunter
FOLEY & LARDNER
Firstar Center
777 East Wisconsin Avenue
Milwaukee, WI 53202-5367

EXAMINER

MALDONADO, JULIO J

ART UNIT PAPER NUMBER

2823

DATE MAILED: 04/10/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/845,654

Applicant(s)

LUKANC ET AL.

Examiner

Julio J. Maldonado

Art Unit

2823

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 30 April 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☒ Claim(s) 15 and 16 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s) _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Specification

1. The abstract of the disclosure is objected to because the application numbers of the related applications are missing. Correction is required. See MPEP § 608.01(b).

Claim Rejections - 35 USC § 112

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claim 20 is rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. On page 8, paragraph [0033] states that the thickness of the metal reflective layer is of 80-200Å and on claim 20 states that the thickness is less than 100Å, which would cover a range of 0-79 Å, which is not disclosed in the original filed specification.

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claim 12 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 12 cites that “the reflective metal layer is not matched to gate material layer”, but it’s silent on which reflective metal layer does not match the gate material layer.

Claim Objections

6. Claims 15 and 16 objected to because of the following informalities: Claims 15 and 16 make reference to a "reflective material layer" in the process described in claim 14. Claims 15 and 16 should recite "reflective metal layer". Appropriate correction is required.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claims 1-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lin et al. (U.S. 5,883,011) in view of Doan et al. (U.S. 5,346,587) and McKee et al. (U.S. 5,804,088).

In reference to claims 1, 3, 7, 9, 14 and 18, Lin et al. teaches a related method to form photolithographic patterns including the steps of depositing a metal nitride layer (106) over a layer of polysilicon (104); depositing an anti-reflective coating (108) over the metal nitride layer (106); etching the anti-reflective coating (108) to form a pattern; etching the metal nitride layer (106) according to the pattern; and removing portions of the polysilicon layer (104) using the pattern formed from the removed portions of the anti-reflective coating (108) (column 3, line 23 – column 5, line 63).

Lin et al. do not teach forming a reflective metal material layer. However, Doan et al. (Fig.3-5) in an analogous method to improve polysilicon gate patterning teach the step of depositing a reflective metal material layer (35) over a layer of polysilicon (column 2, lines 16-35). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to form the reflective metal layer of Doan et al. over the polysilicon of Lin et al. prior to depositing the anti-reflective coating, since using the reflective metal layer in the patterning process would avoid the formation of reflective notching, which in turn, would improve the reliability of the device (column 1, line 13 – column 2, line 35).

Lin et al. in combination with Doan et al. fail to teach the step of trim (selectively) etching the ARC layer using an isotropic etching. However, McKee (Fig.8a-d) in a related method to form field effect transistors teaches the step of selectively removing comprising trim etching the ARC layer using isotropic etching (column 5, line 23 – column 6, line 17). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to trim etch the ARC as taught by McKee after the step of depositing an ARC over the reflective metal layer as taught by Lin et al. and Doan et al., since such process would provide a lateral removal of the ARC layer, thus gives a new pattern to form shorter linewidths to the polysilicon layer (column 1, line 43 – column 2, line 48).

In reference to claim 2, Lin et al. teach the step of depositing a resist layer over the anti-reflective coating (column 4, lines 39-55).

In reference to claims 4, 8 and 15, Doan et al. teach that the reflective metal layer is tungsten silicide, which comprises tungsten (column 2, lines 16-35).

In reference to claims 5 and 10, Lin et al. in combination with Doan et al. and McKee teach all aspects of the invention but fails to teach that the reflective metal material layer has a thickness of 80-200Å. These claims are prima facie obvious without showing that the claimed ranges achieve unexpected results relative to the prior art range. In re Woodruff, 16 USPQ2d 1935, 1937 (Fed. Cir. 1990). See also In re Huang, 40 USPQ2d 1685, 1688 (Fed. Cir. 1996) (claimed ranges of a result effective variable, which do not overlap the prior art ranges, are unpatentable unless they produce a new and unexpected result which is different in kind and not merely in degree from the results of the prior art). See also In re Boesch, 205 USPQ 215 (CCPA) (discovery of optimum value of result effective variable in known process is ordinarily within skill of art) and In re Aller, 105 USPQ 233 (CCPA 1955) (selection of optimum ranges within prior art general conditions is obvious).

In reference to claim 6, Lin et al. teach that the remaining portion of the polysilicon layer (104) is a gate structure (column 3, line 23 – column 5, line 63).

In reference to claim 11, Lin et al. teach that the step of providing a mask layer comprises depositing a layer of SiON and a layer of resist (column 3, line 23 – column 5, line 63).

In reference to claims 12 and 13, Lin et al. teach that the metal nitride layer is not matched to the gate material layer and the step of providing a metal nitride layer

comprising the selection of a reflective metal layer based on etch chemistry of the reflective metal layer and the gate material layer (column 3, line 61 – column 4, line 60).

Lin et al. fail to include a reflective metal layer. However, Doan et al. (Fig.3-5) in an analogous method to improve polysilicon gate patterning teach the step of depositing a reflective metal material layer (35) over a layer of polysilicon (column 2, lines 16-35). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to form the reflective metal layer of Doan et al. over the polysilicon of Lin et al. prior to depositing the anti-reflective coating, since using the reflective metal layer in the patterning process would avoid the formation of reflective notching, which in turn, would improve the reliability of the device (column 1, line 13 – column 2, line 35).

In reference to claim 16, Lin et al. in combination with Doan et al. and McKee teach all aspects of the invention but fail to teach that the reflective metal layer has a thickness of 100 Å. This claim is prima facie obvious without showing that the claimed ranges achieve unexpected results relative to the prior art range. In re Woodruff, 16 USPQ2d 1935, 1937 (Fed. Cir. 1990). See also In re Huang, 40 USPQ2d 1685, 1688 (Fed. Cir. 1996) (claimed ranges of a result effective variable, which do not overlap the prior art ranges, are unpatentable unless they produce a new and unexpected result which is different in kind and not merely in degree from the results of the prior art). See also In re Boesch, 205 USPQ 215 (CCPA) (discovery of optimum value of result effective variable in known process is ordinarily within skill of art) and In re Aller, 105 USPQ 233 (CCPA 1955) (selection of optimum ranges within prior art general conditions is obvious).

In reference to claim 17, Lin et al. teach the ARC layer comprises SiON (column 3, line 23 – column 5, line 63).

In reference to claim 19, Lin et al. teach that the ARC layer is SiON (column 3, line 23 – column 5, line 63).

In reference to claim 20, Lin et al. in combination with Doan et al. and McKee teach all aspects of the invention but fails to teach that the reflective metal material layer has a thickness of 80-200Å. This claim is prima facie obvious without showing that the claimed ranges achieve unexpected results relative to the prior art range. In re Woodruff, 16 USPQ2d 1935, 1937 (Fed. Cir. 1990). See also In re Huang, 40 USPQ2d 1685, 1688 (Fed. Cir. 1996) (claimed ranges of a result effective variable, which do not overlap the prior art ranges, are unpatentable unless they produce a new and unexpected result which is different in kind and not merely in degree from the results of the prior art). See also In re Boesch, 205 USPQ 215 (CCPA) (discovery of optimum value of result effective variable in known process is ordinarily within skill of art) and In re Aller, 105 USPQ 233 (CCPA 1955) (selection of optimum ranges within prior art general conditions is obvious).

Conclusion

9. Papers related to this application may be submitted directly to Art Unit 2823 by facsimile transmission. Papers should be faxed to Art Unit 2823 via the Art Unit 2823 Fax Center located in Crystal Plaza 4, room 3C23. The faxing of such papers must conform to the notice published in the Official Gazette, 1096 OG 30 (15 November

Art Unit: 2823

1989). The Art Unit 2823 Fax Center number is **(703) 305-3432**. The Art Unit 2823 Fax Center is to be used only for papers related to Art Unit 2823 applications.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to **Julio J. Maldonado** at **(703) 306-0098** and between the hours of 8:00 AM to 4:00 PM (Eastern Standard Time) Monday through Friday or by e-mail via julio.maldonado@uspto.gov. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy, can be reached on (703) 308-4918.

Any inquiry of a general nature or relating to the status of this application should be directed to the **Group 2800 Receptionist** at **(703) 308-0956**.

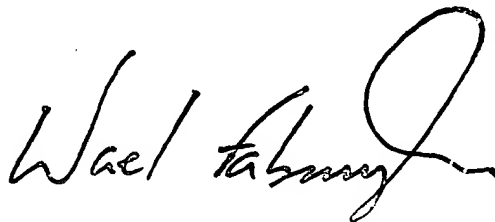
Julio J. Maldonado

Patent Examiner

Art Unit 2823

703-306-0098

julio.maldonado@uspto.gov



SUPERVISORY PRIMARY EXAMINER
TECHNOLOGY CENTER 2800